PACKET STATUS REGISTER

JAN. 1984

Number 9

Tucson Amateur Packet Radio Corporation

The Tucson Amateur Packet Radio Corporation will be holding its annual meeting on February 4th, 1984, in Tucson, Arizona.

The morning session, from 10 AM until 12 Noon, will include introductory packet material for the newcomers to our ranks, along with an informative history of the TNC development.

After lunch, the meeting will convene at 1 PM for a more technical afternoon session. The focus of this session will be on level three protocols and linking. This is the area in which a tremendous amount of development work must be done to make packet a viable mode for serious, long-distance communications. If attendance warrants, separate, parallel sessions will be run at the tutorial as well as the advanced technical levels.

Other topics, including packet operation on OSCAR-10 and hf, will be covered.

Included in the afternoon session will be a description of the UoSAT-B Data Communication Experiment (DCE), a flying packet mailbox-in-space, that is scheduled for a 1 March 1984 (!) launch.

The meeting will conclude between the hours of 4 and 5 PM with the results of the Board of Directors election announced.

An unofficial packet dinner will be held after the meeting at a local restaurant, followed by the Board of Directors meeting at 7 PM.

If you plan on attending, please contact us via PO Box 22888 for the meeting location (which is currently being finalized). Talk-in will be done on 144.91 MHz simplex and on the 146.28/88 MHz repeater. We will be looking for you!

The number of telephone calls being received by TAPR here in Tucson has gotten quite large. We like hearing from you and talking about packet radio, however, please understand that this is only a hobby for us and we must work at other endeavors for a living. The number of telephone calls being received at our places of employment has not escaped the attention of our employers. Please, if you need to contact us, consider doing it by mail. If you must talk to us, please call us at home, not at work. This may not always be effect on the financial security of those of us who receive these calls. Thank you for your consideration.

A weekly net is now being held on 40 meters for Midwestern packeteers and other interested parties. It is on 7158 kHz at 1500 CST, Sundays. Tenatively, 10.140 MHz (LSB) has been selected for usage in HF packet (300 BPS) operations.

BE SURE TO VOTE! There is a ballot on the next to last page of this issue to be used to cast your vote(s) for the vacant positions on the Board of Directors. Also included is a questionnaire that should be filled out (if appropriate) and returned separate from the ballot. These are located such that you can cut them out of PSR without chopping off the end of the article of the other side. If you prefer, you can make a copy or reasonable facsimile, but send one or the other to the TAPR PO box!

In case you hadn't heard, we lost a real friend recently. The following obituary was written for the AMSAT TeleMail BB, and Tom Clark, W3IWI, submitted it to us:

Today was a day of personal sadness for me. I was informed of the passing last night of a friend, a Life Member of AMSAT, an inspiration to our hobby. Vic Clark, W4KFC, the President of the ARRL, passed away following a heart attack at his home in Virginia.

It was only two weeks earlier that many of us had seen Vic at the AMSAT annual meeting. He had the usual twinkle in his eye as we exchanged our old, oft stated personal joke about my being his older brother. His brief comments at the meeting again showed that he viewed AMSAT as a major contributor to the future of amateur radio. Vic's membership in AMSAT stems from the first inception of the organization and he was always there when we needed help. On losing Phase-3A, Vic was among the first to call in offering support by saying "that's OK, WE will do it again".

It is a great pity that Vic did not live to see one of his pet projects come to fruition: the W5LFL flight scheduled to start on Monday. Vic was very much involved in all the planning for this mission. Vic and I (with W3XO doing much of the ghost writing) co-authored the joint ARRL/AMSAT proposal to NASA that resulted in this exciting adventure we are all waiting for.

On hearing of his passing, my retrospective thoughts went back to a time over a quarter of a century ago, when, as a student, I met Vic for the first time. I remember marveling at his abilities as an operator and contester; his exploits made him one of my true heros. Years later, our paths crossed again thru AMSAT. But me and my shaky fist, and we joked about young "wet behind the ears" WØIUF and the QSO's we had. I imagine many others have been similarly inspired by his fine operating skills and his willingness to work with newcomers.

Vic, we'll miss you. I won't be surprised some-day, out of a pileup, to hear a very distant voice saying "Kentucky Fried Chicken". Until then, 73.

(more NEWS continued on page 9)

Presidents Corner

by Lyle Johnson, WA7GXD

Packet radio is on the move!

If 1983 is any precursor to what we can expect in 1984, this should be the year that packet moves from being an experimental mode to being a dominant digital communications technique.

Consider the following:

a) TAPR has seen its ranks swell from about 250 at the beginning of 1983 to nearly 600 at the end of 1983.

b) While no accurate figures are available to me on the number of other TNCs actually assembled and on-the-air, I have heard figures on the order of 100 to 200. To this must be added 170 Beta boards distributed in 1983, plus 200 kits shipped. (And we have a current backlog of around 250 kit orders!) Thus, packet operation nearly quintupled in 1983!

c) Our mailbox used to get about 3 letters a day. Now we see between 20 and 30 a day, with many of these being requests for information on packet, how to get a TNC, etc. This has been a stable rate for several weeks now, not just a random spurt.

d) Many local groups are forming all over the country for the purpose of getting involved in and otherwise supporting packet activity. Many of these groups are contacting us regarding affiliation.

Thus, there is reason to believe that there may be as many as 1,000 additional packet stations on the air during 1984 using TAPR TNCs plus the additional units made available by commercial sources.

In addition, there has been a deluge of information on packet in the popular press. Two feature articles appeared in the summer in Ham Radio, followed by two more articles in 73 Magazine. There were interviews in such computer journals as Popular Computing and InfoWorld.

1984 is starting out with more publishing. The 1984 Handbook has a section on packet in the Specialized Communications Systems chapter (which includes a photograph of a Beta TNC!) and Packet is spelled in large letters on a photograph on the front cover, while the January issue of 73 has the final installment on a packet series.

If all goes well, UoSAT-B will launch in March. Unlike UoSAT/OSCAR 9, which had no communications facility, UoSAT-B has a packet radio store-and-forward experiment on board! A precursor to PACSAT, the UoSAT-B project has been done largely under wraps and on a time schedule that you wouldn't believe! The Data Communications Experiment (DCE) will be the first large-scale amateur digital communications system in space (unlike the early OSCAR Codestore experiments). The story will be told at the TAPR Annual Meeting in February (see elsewhere in this PSR for the meeting announcement).

What else will 1984 hold for packet radio? In my opinion, this is the year for decisions on an initial level three protocol. Level three is linking, and for packet radio to emerge as a dominant mode of amateur communications it must provide fast and reliable communications far beyond the reach of any two-meter digipeater. We must address issues relating to protocol and system design. Software and hardware must be crafted and made available. Speeds on the order of 256 kbps should be achieveable using low-cost technology, both rf and digital.

How will this be achieved? By a lot of blood, sweat and tears from the volunteers that fill our ranks. With the sale of the TNC kits, TAPR has, for the first time, a modest research and development budget that can be expended toward our goals. Elsewhere in this PSR is a short questionnaire. If you are willing to devote hours of your time, earn an ulcer or two, get involved in a few rounds of heated debate and otherwise abuse yourself in the pursuit of something you believe in, please fill it out and send it in with your ballot (also in this issue). We are looking for hardware, software and systems expertise. I expect this to be an intense project -- but a highly rewarding one.

There are also other projects that TAPR would like to assist in. We need hf gateways (we just plain need hf experiments, like a head-to-head packet-versus-AMTOR evaluation or maybe a packet/AMTOR gateway). We need OSCAR-10 gateways. We need a low-cost bulletin-board system that can run on a cheap computer with a disk drive, like a Commodore 64. We need the manual edited into a computer-to-speech system that would be easy for the blind to "read" and look up commands, etc. We need fast turnaround rf decks that can run at 9600 to 19,200 bps and can be cheaply built. We need an applications system that uses, say, a TRS-80 Model 100, and HT, a CMOS-ized (don't you love to coin words?) TNC and a volunteer to provide disaster communications. Such a system should be easily adapted to Red Cross, Civil Defense and other community service organizations. We need your ideas.

I encourage you to vote for five Directors using the ballot provided in this PSR. If you can't attend the Annual Meeting, please mail it today. This will help ensure that we receive it in time to be counted. Please plainly mark the envelope "BALLOT ENCLOSED" and send only the ballot in it, because the envelope won't be opened until February 4th, when the votes are counted. Note that only TAPR members are allowed to vote.

Loose Ends

The TAPR TNC cabinet kit is progressing. We hope to have an initial quantity of 100 cabinets in fabrication by late January.

The manufacturer says 6 to 8 weeks, and we need to lay out two small pc boards, get a few connectors and other parts ordered, write a short (?) assembly supplement to the TNC Manual, and go for it! I appreciate the responses that many of you have sent to us. The initial price will be in the $60 to $70 range (would you believe $69.95?).

The TAPR EPROM Programmer parts will be on order by the time this appears in print. The pressure is now on us to write the manual (we desperately need a technical writer or two to volunteer their time to assist us in the writing of manuals!). The initial price will be $95 plus $7 shipping and handling. Delivery will be dependent on the ability of our suppliers to get us the parts and is expected to be on the order of a couple months.

Have a Happy New Year!

Beta Updates

by Margaret Morrison, KV7D

Software release 3.1 for Beta TNCs is now available from TAPR. This release incorporates all protocol and user interface upgrades implemented in the TAPR 3.1 software released with the new kits. All software functions of the version 3.1 release are implemented in the 24k memory except the onboard Debug facility and the EPROM Programmer support. This release requires only two minor hardware modifications to your Beta TNC.

Release 3.1 for Beta TNCs requires within a few bytes of the 24K bytes of EPROM available. The entire 6K bytes of RAM are utilized. All of the 32 bytes of NOVRAM have been used. Since it is extremely unlikely that any future software upgrades can be modified for memory compatibility with Beta TNCs, you are encouraged to upgrade your TNC to the level of the new kits. An upgrade kit and instructions will soon be available from TAPR. Recommended modifications also include improvements to the modem and power supply, as well as an optional modification to permit Morse Code ID to be send by FSK.

Protocol Upgrades

Up to 8 intermediate digipeaters may now be included in the address field for long-distance operation. This modification is incompatible with older Beta software versions. If more than 3 digipeaters appear in the address field of TNCs in the area, TNCs running older Beta software may function incorrectly.

Up to 10 stations may be included in the Monitor TO and FROM lists. If the station you are connected to is included in the list, packets from that station are now displayed only once.

A connect request to a station already connected, or to a station with CONOK OFF will cause a special reply packet to be sent. Messages will be displayed at both stations, indicating "connect request" to the busy station and "station busy" to the requesting station. These messages are suppressed in Transparent Mode.

The complete address in re-connect packets is examined and changed if necessary. This allows one station to change the digipeat route if a retry-count disconnect occurs leaving the other station "connected".

The automatic Morse Code ID can now be disabled, although an ID can still be performed on command at any time. An optional ID string can be defined with up to 128 characters, including several popular prosigns such as SK and BT. If the automatic ID is enabled, an ID will be sent after a disconnect operation in addition to the 9-1/2 minute interval IDs.

A full duplex mode is provided for OSCAR 10 and other full-duplex radio operations. In this mode, the demodulator carrier-detect input is ignored and packets are acknowledged individually, allowing for increased throughput on OSCAR 10 communications.

The Poll/Final bit is now handled in a way which allows acceptable communication with a board which exactly implements the AX.25 specification. This has been successfully tested with the version 5.1 AX.25 software for VADCG TNCs.

A special feature allows line-feed characters to be added after carriage-returns in outgoing packets (in contrast to the AUTOLF feature which affects local terminal display). This feature permits compatibility with software implementations on VADCG TNCs.

The operation of CR has been changed slightly. It now causes the SENDPAC character to be included in the packet. Previously the character was replaced by a carriage-return in the packet.

The packet-timeout interval range (PACTIME) in transparent mode has been changed. This interval now ranges from 1/4 second to 3-3/4 second rather than 1 second to 15 seconds.

Inconsistent implementation of the retry count has been improved. A problem with response to demodulator carrier-detect which affected full duplex stations has been fixed.

User Interface Upgrades

An autobaud function has been added which will match terminal input at 110, 300, 1200, 4800, and 9600 baud. The value of ABAUD is automatically changed by this routine, which is entered when the default parameters are selected.

Null padding for slow terminals has been changed. Nulls (ASCII code 0 characters) are no longer actually sent, but transmission is delayed for the specified number of character periods. Nulls can now be "sent" after carriage-returns, line-feeds, or both.

Status messages have been added to the parallel-port pins. These include link status, operating mode (Command Mode or data mode), and radio-link activity (carrier-detect status and outgoing message status).

An automatic RAM checkout and message has been added to the sign-on procedure.

The commands MONCON, MONALL, MONTO, and MONFROM have been changed to MCON, MALL, MTO, and MFROM. This permits shorter abbreviations for these commands. The Monitor Mode flags, MONITOR, MCON, and MALL are saved in NOVRAM, as are MTO/MFROM values ALL or NONE. Specific monitor lists are not saved.

BEACON EVERY/AFTER and the beacon interval are now saved in NOVRAM.

A redisplay line character, <ctl-R>, has been added to the special character list. This command retypes on the terminal any partly complete input line. If a packet has been received but not displayed because FLOW ON is set, the packet will be displayed before the input line is redisplayed.

Both terminal and radio-link baud rates (ABAUD and HBAUD) are now displayed and set by value, e.g., 1200, rather than as lookup table codes.

Subcommands have been added to DISPLAY which allow you to show groups of related parameters. The largest of these groups consists of 22 parameters, which allows easy viewing on a video terminal.

The display response to a <delete> character has been changed. If BKONDEL is ON, the response is backspace-space-backspace, rather than a single backspace.

The automatic entry to Converse or Transparent Mode after a successful connect is delayed until the user completes any partially entered command.

A new prompt is issued in Command Mode following line-cancellation and link-status

(continued on page 8)

Thank YOU!!

by Chuck Green, NØADI

Developing the TNC kits involved several major tasks. They are such things as hardware, software and documentation development. As the "editor" of documentation, I want to take this opportunity to thank some of the people who were involved in the development of the Terminal Node Controller SYSTEM MANUAL.

Any time you start naming names, you run the risk of inadvertently leaving someone out. There are some, that made such substantial contributions to this effort that they must be mentioned.

Pete Eaton, WB9FLW, is a real "get it done" kind of person and doesn't mind doing far more than his share to see that it happens. He was heavily involved in preparing many of the figures and illustrations and working with the commercial artists in getting them ready for printing. He also arranged for the PC board layout and is president of SLAPR.

Eric Gustafson, N7CL, is a full-time student at the university. Along with contributing to the documentation, he also performed several photographic tasks for TAPR and did part of the hardware design.

Lyle Johnson, WA7GXD, is the busiest person I know. He wrote most of the hardware portions of the manual including the assembly instructions. He is also the designer of most of the hardware and holds some trivial office in TAPR.

Dan Morrison, KV7B, has been a consistent contributor to the entire development effort. He was involved in writing several sections and did the final DIABLO printing of the document for reproduction. He was also involved in other aspects of the TNC development.

Margaret Morrison, KV7D, is an incredibly talented and hardworking individual. She was responsible for writing the single largest portion of the manual. She also wrote a major portion of the software and coordinated the the entire software effort.

Jay Nugent, WB8TKL, is the Beta coordinator for Michigan. He performed the very large task of doing the CAD drawings of our schematics for us. They sure look better than the old hand-drawn schematics in the Beta version of the document.

Harold Price, NK6K, is a driving force in anything he is involved in. He provided several pieces for the document. He is also a major contributor to the software effort and is Project Director (or some such title) for PACSAT.

We should also mention AMRAD and Hank Magnuski, KA6M, who gave us permission to reprint their documents in Appendices B and C.

Except for Pete, all the rest of us have full time jobs to attend to. Pete flew in to Tucson and spent about a month and a half here helping us "get it together". If you encounter any of these individuals, be sure to thank them for a job well done. I think you will agree that the TNC SYSTEM MANUAL is a worthy part of a superb TNC kit. Yes, there are errors in the document (see Errata elsewhere in this PSR) and if you find any new ones, please write us and let us know so they can be corrected in future printings.

If you are thinking about obtaining a TNC kit or are just interested in what is going on, you may want to purchase a manual separately. The price of the manual and optional binder can later be applied to the purchase price of a TNC kit.

The Stork?

by Chuck Green, NØADI

When stacked ten high, one hundred TNC kits make a wall ten feet long and four feet high. After working on this project for about two years, November 21st is an exciting day. Seeing all those kits lined up waiting for the UPS truck the next day is quite satisfying. I wonder if their new owners can possibly understand all the love and care that was involved in their conception. The thousands of hours of work provided by hundreds of people has finally come together. The first shipment of kits representing the beginning of general availability is ready to go.

Like proud parents, we took turns photographing each other standing beside these new-born infants. I'm sure everyone will want to see these pictures at the annual meeting in February. We might even want to show them twice. Who could resist looking at all these little darlings?

Come to think of it, how could anyone package up their children and submit them to the whims of the United Parcel Service? How cruel! We can't do this, can we? I mean, they are ours, aren't they? Didn't we bring them into this world? Surely no one would expect us to ship them all over the world at such a young age!

Perhaps we should call UPS and tell them not to come yet. Then we could heat up our soldering iron and start raising these infants. When they have become young adults, it would be more natural to call UPS and send them out into the world. The process would only take a few short years. And besides, we could enjoy the children while they are growing up! People really wouldn't mind the delay, would they? Well, maybe they would become just a little bit impatient - maybe. And I suspect they might enjoy raising these little ones themselves.

If we ship them to lots of different people to raise though, they might not all turn out the same. I mean each might develop its own personality having been raised in a different home. Who knows what kind of perverse configuration all those people might teach these young, impressionable NOVRAMs. Well, we did pre-train the PROMs. Still, they are E-PROMS. And then there is Appendix F. That should help achieve some consistency (Dr. Spock, eat your heart out). Maybe they would grow up O.K. after all.

I guess we will just have to take a chance and let UPS take them in the morning. Then we can get busy producing the other three hundred siblings already on order! Still, would people mind if we took just one more look at our first-born just before turning out the light?

In response to questions about the legality of using 1000 Hz AFSK shift on HF, Ralph Wallio, WØRPK, researched the issue and found this FCC amended regulation section 97.69 paragraph A. section 2. effective June 15th, 1983. Previous to this amendment we were restricted to 900 Hz shift on all amateur bands: after the amendment we are restricted to a maximum of 1000 Hz shift on frequencies below 50 MHz and to a maximum that shall not exceed the sending speed, in baud, or 1000 Hz which ever is greater, for frequencies above 50 MHz.

This amendment does not change the maximum signaling rate allowed for 28 MHz and below (300BPS), 28 to 50 MHZ (1200BPS) and the remainder of our signaling rate vs. band regulations.

Consult August, 1983 pp57 for more on the above.

Rev.II Typos

by Lyle Johnson, WA7GXD

Somehow, a few typos crept in to the TNC Manual. The editors and writers, working at 2 am on this project, still haven't figured out how this happened...

Chapter 1

Page 1-5 second paragraph, change the phrase "out Beta test" to "our Beta test".

Chapter 3

Page 3-1 second paragraph, change "while it is is Command Mode" to "while it is in Command Mode". Page 3-4, second to last paragraph, add an apostrophe to the first line "make full use of the TNC's capabilities". Page 3-24, first paragraph, change "and software provides" to "and software provide".

Chapter 6

The paragraph between the tables, in the second table, and in the paragraph following the tables, change pin 24 to pin 16, pin 23 to pin 2 and pin 22 to pin 15.

Appendix A

On page A.1, the two diodes feeding regulator U23 are backwards. they are also not labelled (they are D12 top and D11 bottom). C5 is missing its polarity marking, + is to ground. The diodes feeding U24 are not labelled (see page A.3 for these values).

On Page A.2, U8 is not a 6264. It should be left blank for IC type, as jumpers JP6 and JP8 allow it to accept almost any kind of bytewide memory device.

Page A.3 is, oddly enough, correct!

Page A.4 has a few bugs. Note 9 should not include the phrase "for cwid." The ground connections on C61, C62 and C64 should be marked "A" for analog. The note on C19 should reference 3k for both cases, not 30k. R59 should be marked optional (see page 2-3 in the manual for an explanation).

Appendix F

On page F-17, R59 should be referenced as 560 ohm resistor with a note to please read page 2-3 in the front of the manual.

Page F-19 (bottom) change "two resistors remaining" to "three resistors remaining".

Page F-55, middle paragraph listing remaining parts, add "and possibly one 560 ohm resistor."

Page F-58 bottom paragraph, change "almost any common" to "almost all common".

If you find any additional errors, please call them to our attention so the next printing can be even better! Send to the TAPR PO Box, ATTN: Manual Editor. Thank you!

One of the production kits that ended up in the San Diego area had an incorrect component. The 20K pot used to set the mark tone was actually a 20 ohm pot. This error is a very easy one to miss if you are not looking very carefully. The symptom was that the mark tone would not adjust. If you have problems with adjusting the mark tone look very carefully at this pot.

Part Prices

(as of December 3, 1983)

In order to better support the TAPR TNCs in the field, the following replacement parts price list is being published. Note that all prices are subject to change without notice, and that many parts are in short supply. Immediate availability is not guaranteed. Please direct all orders to the TAPR PO Box and mark them ATTN: Replacement Parts Orders. Include the serial number of your TNC for faster service. Thank you.

P/N	Price	P/N	Price	P/N	Price
CFR1/4-XXX	0.10	CFR1/8-XXX	0.25	68WR-XXX	1.95
DISC-103	0.25	DISC-104	0.25	DISC-152	0.25
DISC-154	0.75	DISC-331	0.25	DISC-503	0.25
MONO-103	0.45	MONO-222	0.95	MONO-223	2.75
RAD16V-105	0.25	RAD16V-106	0.25	RAD06V-107	0.25
RAD06V-337	0.35	RAD25V-477	0.65	RAD16V-228	0.95
1N4001	0.25	1N4148	0.25	1N4752	0.35
1N5400	0.65	SR-503D	0.35	VN10KM	1.00
LM309K	2.25	UA78L05	0.75	UA7812	1.00
UA79L05	1.00	UA7912	1.00	74LS00	0.65
7406	0.65	74LS10	0.65	74LS14	0.80
74LS86	0.65	74LS393	1.00	MC1488	1.75
MC1489	1.75	74S288	2.75	NE555V	0.75
LM1458	0.80	XR2206	3.95	XR2211	3.50
XD2212	12.75	MF-10	4.75	MC6809	9.75
MC6821	3.50	SY6522	5.75	SY6551	5.75
WD1933	2.50	8KRAM	50.00	2764-( )	10.00
DIPS-08	0.25	DIPS-14	0.35	DIPS-16	0.40
DIPS-18	0.45	DIPS-20	0.50	DIPS-28	0.65
DIPS-40	0.75	HM-02	0.30	HM-03	0.40
JMP-02	0.30	HMSEL-20	3.25	DE09PCR-S	3.25
DB25PCR-P	3.95	DB25PCR-S	4.65	MOLPWR-07P	0.65
DIPH-14	1.00	DIPH-16	1.25	XTAL-073	1.95
DIPSW-02	1.50	MS632-5/8	0.10	MN632	0.10
MW632-FLAT	0.10	MW632-LOCK	0.10	MOLPWR-07S	0.60
MOLPWR-PINS	0.10	DE09-P	2.50	W20S-36	0.45
HST03-1	3.25	TNCPC-R2	39.00	XFMR-TNC-2	8.95
DE09-BACK	2.25				

Please include $3.00 for US domestic shipping and handling for all orders except for P/N TNCPC-R2 and P/N XFMR-TNC-2 which require $5 for US domestic shipping and handling.

How's this for an active area? Note the check-in times! This is a dump of the user list from WB6UUT's bulletin board system (packet-only on 145.35 Mhz):

Call, Name	Location	Last Access
KA6AIO, Dave	Mission Viejo	12/05/83 9:54 PM
WA2AMB, Bill	Hermosa Beach	12/05/83 11:47 PM
WD6AWP, Tim	Seal Beach	12/02/83 4:16 PM
WA5BNH, Leon	San Diego	12/05/83 7:01 PM
WA6CFM, Rich	Point Loma	12/05/83 9:34 PM
WB5EKU, Don	Sepulveda	12/02/83 7:06 PM
WD6FPY, BILL	SAN DIEGO	12/01/83 7:50 PM
WB6HHV, Mike	Mira Mesa	12/05/83 11:02 PM
WA6JPR, Wally	Redondo Beach	12/03/83 10:23 PM
NK6K, Harold	Redondo Beach	12/06/83 3:56 PM
WA6OVY, Rich	Long Beach	12/05/83 9:27 AM
WA6OZJ, JIM	PALOS VERDES	11/25/83 9:41 AM
NG6P, Roger	Glendale	12/05/83 6:07 PM
N6TE, Harry	La Jolla	12/03/83 11:13 PM
WA2TMP, Al	Santa Ana	12/05/83 10:05 PM
WA6TUB, Steven	Hawthorne	11/26/83 6:49 PM
WB6UUT, Lynn	Laguna Beach	12/06/83 3:12 AM
WB6YMH, Skip	Palos Verdes	12/05/83 9:03 PM

Net	Subject	Last Ent
ALL	Of interest to all users	12/06/83 3:51 PM
ARRL	W1AW bulletins	10/29/83 9:02 PM
OSCAR	Information on AMSAT/Oscar	12/01/83 1:06 AM
PROTO	Protocol Discussion/Forum	10/07/83 1:32 PM
SWAP	Gear Wanted/For Sale	12/03/83 1:54 PM

HF Packets

by Dan, KV7B, and Margaret, KV7D, Morrison

The team of Morrison and Morrison have come up with something a number of you have been waiting for: a re-configured MF-10 filter that gives you flat response for use at 1200 baud on hf and OSCAR.

The computer optimization system we use says that this design is essentially flat from 800 to 2200 Hz, rolling off by 3 db at 400 Hz and 2600 Hz. At the low end and the high end it rolls off with a characteristic 4-pole behavior, initially around 10 db/octave at the high end. Furthermore, the filter has almost perfectly linear phase from below 200 Hz to over 3100 Hz, which should make it ideal for this application.

We've calculated the 8 resistors necessary to make this new configuration and we'll give them two ways: one way for the new kits, and the other for Beta boards. First, the kit boards:

Resistors on the dip header next to the MF-10 are shown in Fig. F.7, and are labelled R58, R57, R56, R55, R52, R54, R53, and R51. These should be replaced as follows, bearing in mind the special instructions for R55:

Change R58 to 23.7 k
Change R57 to 10.0 k
Change R56 to 11.4 k
Change R55 to 10.0 k and move the end previously attached at pin 4 to pin 7 of the header.
Change R52 to 43.7 k
Change R54 to 10.0 k
Change R53 to 38.0 k
Change R51 to 10.0 k

Please note that some of these "changes" correspond to resistors already on the board.

On to the Beta board: On the dip header next to the MF-10:

Change the resistor between pins 1 and 16 to 10.0k
Change the resistor between pins 2 and 15 to 38.0k
Change the resistor between pins 3 and 14 to 10.0k
Change the resistor between pins 4 and 13 to 43.7k
Change the resistor between pins 5 and 12 to 10.0k
and move the end previously attached to pin 5 over to pin 2.
Change the resistor between pins 6 and 11 to 10.0k
Change the resistor between pins 7 and 10 to 11.4k
change the resistor between pins 8 and 9 to 23.7k

These resistor values and the re-routing of the 10.0 k resistor between sections converts the filter to a bandpass filter followed by a lowpass filter. Each section is second order.

Good luck, and let us know how it works out!

We're also working on a set of narrow-shift modem configurations for the TNC which will optimize the modem for use with 170 Hz shift operation. It will require replacement of a number of the parts associated with the MF-10, the 2206 and the 2211. On the kit board this should be as easy as purchasing the parts and putting them on the appropriate dip headers. On the Beta boards it will require some part replacement on the board itself. We're planning on releasing the new configurations by mid-January, and they will be for the following modem characteristics:

Configuration 1:

Center frequency: 1700 Hz
Shift: 170 Hz
MF-10 bandwidth: 500 Hz
2211 optimized for this operation

Configuration 2:

Center frequency: 800 Hz
everything else as in configuration 1

Configuration 3:

Center frequency: 2210 Hz
everything else as in configuration 1

These three configurations should give everybody some way to do optimized HF packet.

1700 Hz Calibrate

by Clay Bartholow, KDØBY

One of the problems of the Beta TNC's is the setting of the 1700 Hz center frequency of U18, the FSK demodulator. Due in great part to the unusual waveform generated by this chip, the calibration counter fails to give the user an accurate measure of this hardware parameter. The Beta tester's manual doesn't shed much light on this subject either, except to acknowledge the problem and send us scrambling for our frequency counters. But there's the rub, because this device doesn't provide a place to directly measure it's center frequency in normal operating configuration.

One of the seemingly obvious points to look for the 1700 Hz signal would appear to be either pin 13 or 14 which are the VCO timing capacitor connections. These points are subject to the capacitance of a 'scope or frequency counter probe, however, and measurements taken without this in mind will produce questionable results. In order to measure the frequency at this point we need a high impedance probe to avoid circuit loading. Fortunately, there is a unity-gain buffer (U20) on the Beta board that will serve this purpose nicely. By modifying the on-board calibration routine it is possible to eliminate this problem and make use of any handy probe to make the measurement.

Here is the procedure:

1) remove jumper 5;
2) set jumper 4;
3) short U18 pins 2 and 10;
4) connect frequency counter or 'scope to the mic. audio line at pin 5 of J3 or to the pin of jumper 8 which is nearest the board edge;
5) adjust R16 (top pot) for 1700 Hz or pulse repetition time of 588 microseconds;
6) reverse steps 3,2 and 1 to complete.

Here are a few notes regarding this procedure. Setting jumper 4 allows U20 to act as a high impedance buffer for our frequency counter or 'scope input. U20 serves this function in the normal calibration routine as well. Pins 2 and 10 must be shorted to each other to insure a stable input signal to U18 and results in a stable waveform for measurement. The calibration routines do not have to be entered to perform this adjustment, but it would be a good idea to do step 6 to insure the proper setting of all jumpers for normal operation.

U18 is an XR-2211 and is a member of the EXAR family of phase-locked loops. A good deal of information is available on their use, either directly from EXAR or from several books on PLL's. The EXAR material is probably the best because they address the adjustment procedures directly. There are additional methods outlined for center frequency adjustment and the time spent learning about and using them is well worth it.

Hardware Happenings

by Lyle Johnson, WA7GXD

This issue we look at the new kit TNC, list a number of Beta mods and answer some of your questions about the new TNC versus the Beta design.

For those of you who wish to use socket U8 on your kit TNC, here is some information on jumper configuration for JP6 and JP8.

IC type	JP6	JP8
2k Static RAM	Left	Left
2716 5v EPROM	Left	Left
X2816A EEPROM	Left	Left
2732 EPROM	Right	Left
2764 EPROM	Right	Left
27128 EPROM	Right	Right
6264 8k RAM	Right	Left

The TAPR EPROM programmer is able to use this socket for copying data from EPROM to RAM and back to another EPROM. It can also copy from an EPROM in socket U8.

Those of you who are into independent software development will be glad to know that socket U8 is already mapped for 16k bytes, from $4000 through $7FFF, via the address decoder PROM, U4.

Beta Upgrade

As noted elsewhere in this PSR, a version 3.0 software upgrade is available for the Beta board, providing full compatibility with kit TNC software. Notable enhancements include the ability to specify up to 8 digipeaters and storage of more user settable parameters in the NOVRAM memory.

A minimum upgrade kit consisting of a 74LS86 IC, an XD2212 NOVRAM, a VN10KM VFET, an IC socket for the 74LS86, set of instructions for the modification and a reprint of the new manual Chapter 4 (Commands and Messages) will be available soon for $16.00 postpaid in the USA. See the version 3.0 article for information on getting your software (EPROMs) updated.

A maximum upgrade kit which will include an 8k static RAM, an additional 2764 EPROM, a new address decoder and instructions will be made available at a somewhat later date for an additional $48.00 postpaid in the USA. The reason for the later date is, quite simply, a shortage of the 8K static RAM IC. The reason for the high cost is also due to the 8k RAM.

What are the differences between a fully upgraded Beta board and a kit TNC?

The primary differences are that the kit TNC has a more easily modified modem through the use of DIP headers for configuring the XR2206 modulator and XR2211 demodulator as well as a complete modem disconnect plug. For those of you who will be operating on VHF FM, these improvements won't mean much. For those who want to do a lot of experimentation with other modems, or change from hf to VHF FM or OSCAR, the changes will be more significant.

Of course, the real bummer is that the new TAPR TNC case is designed specifically for the new kit TNC and the Beta unit just won't fit.

How can I improve the modem operation on my Beta TNC? The easiest modification to make, and one which buys you many db in input audio level tolerance, is to do the following:

1) Change C19 from a 10 uf electrolytic to a 0.1 uf ceramic capacitor.

2) Disconnect the lead of C13 (0.1 ufd ceramic capacitor) that ties to the junction of resistors R35 (6.8k -- blue-grey- red-gold) and R36 (68k -- blue-grey-orange-gold).

3) Connect this lead of C13 to J3 pin 3 (receiver audio input).

You will now be able to tolerate significantly higher audio drive levels to your TNC. What you have done is to remove the RCVR AUDIO LEDs from the audio signal path, eliminating the rectification and clipping effects introduced at moderate to high audio signal levels.

Another simple modification is to reduce the size of capacitor C18 from 1 uf to 0.1 uf. If you listen to your transmitted audio and notice any low frequency "garbage" on your signal, this mod will help clean it up and make your signal easier for other stations to copy. If you have a microphone input impedance on your radio less than about 3k ohms, don't make this change.

If your radio has a key-up voltage higher than about 13, or needs a "contact closure" (less than about 0.8 volts closed circuit) to key it, remove U21 and bend or clip leads 4, 5, 12 and 13. This removes U21 from the transmit key line. Now, add a VN10KM (available from Radio Shack) on the bottom of your board. Tie the Source lead to pin 8 of the U21 socket, the Drain to pin 12 or 13 and the Gate to pin 4 or 5.

If you are in a strong RF environment, try adding 0.01 uf bypass capacitors from J3 pin 4 to ground, pin 5 to ground and pin 3 to ground. This helps keep rf from getting into the TNC via your radio interface lines.

The kit TNC MF10 audio filter has been updated slightly. You can get most of the improvement by simply swapping two resistors in your MF10 header. Move the 76.6 k resistor between pins 3 and 14 to pins 2 and 15. Likewise, the 10.0 k resistor between pins 2 and 15 should go across pins 3 and 14.

Finally, the modem is especially susceptible to power supply noise. If you have a really deaf board, change C24 from 0.1 uf to a 10 uf electrolytic or tantalum. Do the same for C41 -- and watch the polarity. These are the NEGATIVE voltage regulators.

Add a 0.1 uf bypass capacitor from U15 (1488) pin 14 to ground (pin 7) and another 0.1 uf capacitor from pin 1 of U15 to ground. This will keep RS-232 switching noise from being coupled into the modem circuitry.

If you are in a low line voltage area (below about 122 VAC), you may have excessive ripple on your dc lines. The original Beta power transformer was incorrectly specified and is the culprit. The 5-volt part is okay down to about 110 or even 105 vac, but the +/- 12 windings are not. One fix is to use a 24 vct additional transformer, such as a Radio Shack 300 mA type. Another solution is to obtain a kit TNC transformer. These are smaller than the Beta transformer and have a tapped primary to allow operation at 105, 115 and 125 vac line levels. See the TNC replacement parts price list in this PSR for details (ref part number XFMR-TNC-2).

(continued on page 8)

(continued from page 3)
messages. This produces better alignment of the error pointers produced by the parser. An empty command line (just a carriage-return) no longer produces an error message.

Implementation

Implementation of version 3.1 software for Beta TNCs requires two hardware modifications. Both modifications are straightforward.

First, the line from the 6522 PA1 (pin 3) to Switch 2 must be cut. This line is on the top surface of the board. To cut the line without affecting the appearance of the board, you may carefully remove the 6522 from its socket and cut the trace as it runs under the chip. If you do this, you will see four straight horizontal traces running under the chip near the top of the socket. The third trace from the top, which goes directly to Switch 2, is the one to cut. You should carefully remove about a 1/4" section of the trace to insure a true "open". Failure to make this modification may result in damage to the 6522, as this line has been changed from an input to an output. Powering up the board with Switch 2 in the wrong position may result in damaging output contention if the modification is not made.

Second, the 1933 MISCIN* pin (pin 24) must be tied to +5 volts. We recommend that you do this by connecting a 10k ohm resistor between this pin and +5 volts on the bottom of the board. A convenient place to find +5 volts is at the positive supply end of the bypass capacitor attached to pin 14 of U25. Failure to make this modification will result in the modulator tone frequently being turned off during data transmission.

To obtain a copy of version 3.1 Beta software, please send your old proms to TAPR, c/o Margaret Morrison, 4301 E. Holmes, Tucson, AZ 85711. Make sure the proms are carefully packaged to protect against static discharge or mechanical damage, and include sufficient money to cover return postage and handling. If you prefer to purchase new proms, they are available for $30 per set including shipping (within the United States). We will ship your reprogrammed proms withing one week. We prefer pre-erased proms, which will be processed more promptly. Copies of the TAPR kit manual, approximately 240 pages in length (without notebook cover) are available for $15. A copy of Chapter IV, Commands and Messages, Beta TNCs.

Getting Started

You will have to boot from ROM (Switch 1 set ON) the first time you start up your TNC with the new software. Several parameters have been moved, and the random values for terminal attributes and special characters that result if you try to boot from NOVRAM may result in very poor operation! The autobaud routine is entered when you start up with Switch 1 set. The baud rates used by the autobaud routine are 9600, 4800, 1200, 300, and 110. You should type an asterisk (*) every couple seconds until you see the sign-on message. You should not have to type this more than 3 or 4 times. The autobaud message is typed at 300 baud, and if your terminal is at 300 baud, you should type the * while the message is being printed.

Once you see the sign-on message, you should set MYCALL and any other parameters you wish to change from the defaults, type PERM, and set Switch 1 OFF. For a quick list of most of the command keywords, type DISPLAY. This will show you only the commands that set parameters; however, the immediate commands, such as PERM and CONVERSE have not been changed from the previous software versions.

(continued from page 7)

Notes on the kit TNC...
(or, Are there problems in paradise?)

IF YOU HAVE A KIT TNC, PLEASE CAREFULLY READ THIS SECTION FOR IMPORTANT INFORMATION!

We have noted that the silkscreen information for C7 (Quadrant 3 - page F-27) is incorrect and the POLARITY IS BACKWARDS. Please reverse C7 on your TNC!

The TNC assembly instructions failed to note the change in value of R66 (Quadrant 2 - page F-15) to 68K (blue-grey-orange-gold). Please install this resistor in place of the 6.8K called out.

A couple of minor nuisance problems have appeared on at least three of the nearly 200 kit TNCs shipped to date (21 December 1983):

Some TNCs were shipped with R38 (20K) (Quadrant 3, page F-19) supplied with a 20 ohm part. If you can't calibrate the 1200 Hz tone on your TNC, verify that R38 is in fact a 68WR-20K and not simply a 68WR-20. Contact us for a free replacement.

Similarly, a very few units were shipped with a right-angle connector for J5 (Quadrant 4 - page F-37) instead of the straight style part. If you have the incorrect part, please contact TAPR for a free replacement.

KØPFX noted his DCD LED was lighting for no apparent reason while doing testing on the TAPR EPROM programmer. The cause was oscillating voltage regulators! The simplest fix -- or preventative maintainence -- is to add a SHORT jumper wire from U23 pin 3 (this is the lead of U23 closest to the "top" of the board) and C6 +. It turns out that the electrical path from C6 + to U23 pin 3 is a little longer than necessary.

If you try to interface a Radio Shack Model 100 portable computer to your TNC you will probably notice that it doesn't seem to be able to get the TNC's attention on the RS-232C port. The problem is that the Model 100 uses a 0 volt output level to act as a valid output. The RS232 spec says this is an invalid output level, but the Model 100 doesn't seem to be aware of this.

The fix is to either remove R4 (6.8 K, blue-trace joining R4 and R1 on the bottom of the PC board and add a short jumper from the "free" end of R4 to the cathode of D18 just above it. The second solution is better because it returns the data input line on the RS232 port of the TNC to -12 volts through R4, which acts as a pull down and assists the TNC in communicating with substandard "RS232" serial port implementations.

Radio Port connector J3 may be subject to more stress than is desireable with its current mounting method on the kit TNC. We suggest that you use some sort of adhesive (hot melt glue, epoxy, "crazy glue" or whatever) to secure this connector to the PC board. This will relieve the strain that may occur on the connector's leads.

If you have any hardware-related experiences relevant to packet radio to share with us, please send them to "Hardware happenings" c/o the PSR Editor listed at the back of this issue of PSR.

The first packet radio QSO in central Iowa took place at 0100 CST on 12/03/83 between Mike McQuiston, WAØWYW and Ralph Wallio, WØRPK, only hours after they were received. Many other TNC kits are under construction by others.

(NEWS continued from page 1)

TAPR has received a letter from the Internal Revenue Service, Department of the Treasury, dated 12/02/83. Excerpts from that letter follow:

"..., we have determined you are exempt from Federal income tax under section 501(c)(3) of the Internal Revenue Code."

"..., you will be treated as a publicly supported organization, and not as a private foundation, ..."

"Grantors and donors may rely on the determination that you are not a private foundation..."

"Donors may deduct contributions to you as provided in section 170 of the Code. Bequests, legacies, devises, transfers, or gifts to you or for your use are deductible for Federal estate and gift tax purposes if they meet the provisions of sections 2055, 2106, and 2522 of the Code."

Because it is not practical to reproduce the entire letter here, these excerpts do not reflect the time limits and items TAPR must do to continue this status indefinitely. For most people, the above is adequate. If you have any special questions or concerns, send us a note and we will send you a copy of the entire letter. TAPR is very pleased with this IRS determination and sees no difficulty in satisfying the requirements necessary to continue this status.

The TNCs have been shipping a little slower than we would like to see. This is due to the inaccurate forecasts of production that some crucial IC manufacturers have made. As this is written, we have 200 kits ready to ship -- except there are 5 ICs that we are short. We have been working closely with the manufacturers of these devices, and they have been more than fair to us within the constraints of the present parts allocations with demand far exceeding supply.

We request your patience as we try to get this resolved. We should be shipping 50 kits by the end of the first week of January. Check in to the TAPR HF net for up-to-the-minute staus reports on Sundays UTC.

From the New Scientist, 19831013, page 73:

"Britain's mailbox heads for the skies"

A British-built satellite that will act as a "mailbox in the sky" for radio amateurs should go into orbit early next year. The vehicle, the second in a series of cut-price satellites built at the University of Surrey, will contain an electronic memory that receives messages from the personal computers of radio enthusiasts. The memory will store the messages, transmitting them to receiving equipment only when the satellite is in the right position above the Earth.

For a team of 20 engineers at the university, building the space vehicle will be a race against time. NASA in the US has told the group that its satellite can hitch a free lift into space on board a rocket due to leave the ground in March. The rocket's main mission will be to take into orbit a remote sensing satellite to replace the ailing Landsat 4. But the Surrey team will have to squeeze into six months work that would normally take up to three times as long.

The univeristy's first spacecraft, UOSAT-1, is still circling the globe two years after it was launched. It gathers information about radiation levels and the Earth's magnetic field. The satellite also has a speech synthesiser with which it relays spoken messages to receiving station. Martin Sweeting, the leader of the university team, regulary tunes into the messages with a cheap radio in his back garden. He has even "listened in" while on holiday in the Himalayas.

A second part of the project is to find cheaper ways of building satellites. The first Surrey vehicle cost &250,000. A comparable craft built by industry would cost some 40 times as much.

Phil Karn, KA9Q, reports that the November 1978, Part I issue of the IEEE Transactions on Communications is devoted to the details of the communication systems used on the space shuttle.

(more NEWS continued on page 10)

MEMBERSHIP APPLICATION

Tucson Amateur Packet Radio Corporation
P. O. Box 22888, Tucson, Arizona 85734

Name:_____

Call Sign:_____ License Class:_____

Address:_____

City & State:_____ Zip Code:_____

Home Phone:_____ Work Phone:_____

If you wish not to have any of the above items published in a membership list, indicate here:

_____

I hereby apply for membership in TAPR. I enclose $12.00 dues for one year.

Signature:_____ Date:_____

Which Beta Test site (if any) is closest to you?

_____

QUESTIONNAIRE

If you wish to participate in development of high-speed linking systems for packet radio, please send TAPR the answers to the following questions:

a) Name
   Full Address
   Phone (day/night)
b) Area(s) of Expertise:
   Software (languages)
   Hardware (digital or RF)
   Protocol/Systems Design
c) Computing Facilities available to you.
d) Other pertinent information.

BALLOT
Board of Directors Election
Vote for FIVE (5) of the following seven:

_____ Tom Clark, W3IWI
_____ John Dubois, W1HDX
_____ Peter Eaton, WB9FLW
_____ Margaret Morrison, KV7D
_____ Harold Price, NK6K
_____ Pat Snyder, WA0TTW
_____ Lynn Taylor, WB6UUT

Please mail this ballot to TAPR, P.O. Box 22888, Tucson, AZ 85734, with the outside of the envelope clearly marked "BALLOT ENCLOSED".

(NEWS continued from page 9)

On the evening of November 28th, SLAPR marked its 16th month as an orginization dedicated to promoting Packet Radio and the publishing of the Bi Monthly "SLAPRProtocol newsletter.

It was decided that due to pressing personal concerns by SLAPR's Officers and the editor of our newsletter to restructure the club as follows:

1) On 1/1/84, Spence Branham, KAØIXI, will become care taker of SLAPR, and will handle all administrative functions for the coming year.

2) The offices of President, Vice-President, and Secretary/Treasurer will be dropped and the scope of the organization will be limited to local packet activity.

3) After the Nov/Dec issue of SLAPR Protocol the newsletter will cease being published and all inquires to SLAPR should be sent to Spence, and NOT our newsletter editor's address in Edwardsville. Please address all correspondance to:

Spencer T. Branham, KAØIXI
9926 Lewis and Clark
St. Louis, MO 63136

I wish to express my thanks to Gus W9OFZ, Mel KØPFX, Ed KAØAYO, and Bill WDØETZ and all the members of SLAPR for there support and efforts during my time as President. SLAPR's gold was to spread the word about Packet and I feel that has been done. A lot has happened in the last 18 months the next year and a half should be just as exciting, probably even more so!

The **Tucson Amateur Packet Radio** Corporation is a nonprofit scientific research and development corporation. The Corporation is licensed in the State of Arizona for the purpose of designing and developing new systems for packet radio communication in the Amateur Radio Service, and for freely disseminating information acquired during and obtained from such research.

The officers of the Tucson Amateur Packet Radio Corporation are:

Lyle Johnson ..... WA7GXD ... President
Den Connors ..... KD2S ..... Executive VP
Heather Johnson .. N7DZU .... Secretary
Chuck Green ..... NØADI .... Treasurer

The Packet Status Register is the official publication of the Tucson Amateur Packet Radio Corporation. Explicit permission is granted to reproduce any material appearing herein, providing credit is given to the author and TAPR.

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This address/ID is to be used ONLY for submission of publication material to the editors.

TAPR HF Net: 21.280 or 14.235 MHz
1900Z Sundays

The Packet Status Register is edited and prepared by the following members of the MAPR group in the Twin Cities, MN, using any material that will fit, from anyone/anywhere we can get it:

Pat Snyder ..... WAØTTW Paul Barnett .... NØCR

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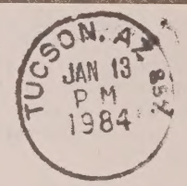

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Check YOUR address label for membership EXPIRATION date !